

**WHAT I DON'T KNOW  
WON'T KILL ME...**



# ABOUT THE SPEAKER

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- S-130/190
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# WHAT IS FIRE SMOKE?

- **Are Wildland firefighters exposed to hazardous atmosphere?**

- **Fire Smoke**

- Benzene
    - Carbon Monoxide
    - Hydrogen Cyanide
    - Sulfites
    - Nitrates
    - Formaldehyde
    - Acrolein





# WHAT ELSE ARE WE EXPOSED TOO....

- Idling Generators
- Idling Apparatus
- Chain Saws
- Brush Cutters
- Portable Pumps
- Drip Torches



# 'DO YOU STILL THINK YOU DON'T NEED TO KNOW?'

- Have any wild land firefighters ever died from a preventable means?

✧ What were the signs.....

- ✓ Headache
- ✓ Heat Related Complaints
- ✓ Dizziness
- ✓ Nausea
- ✓ Vague Non-specific
- ✓ Dehydration



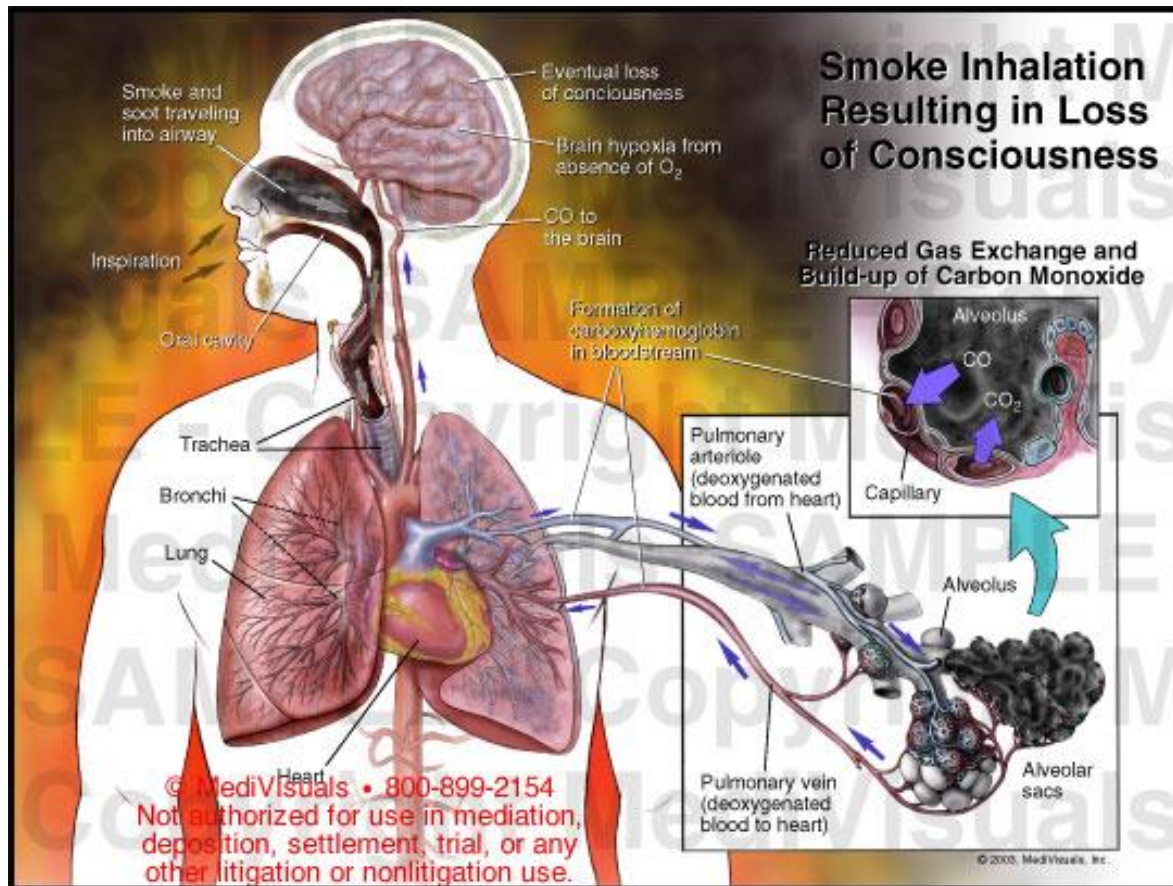
# SCENARIO

**A Type 2 hand-crew was assigned to cut open some smoldering trees along an established fire line to prevent potential fire spread. Upon completion of their shift a firefighter complains of headache with associated nausea.**

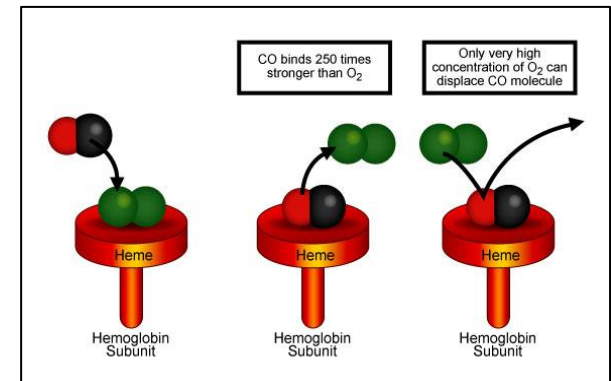
**What are some potential causes of his symptoms?**



# EXPOSURE SEQUENCE



Exhibit# 203081\_02XR



# LONG-TERM ISSUES

*“Myocardial injury occurs frequently in patients hospitalized for moderate to severe CO poisoning and is a significant predictor of mortality”*

A recent study demonstrates that a patient has a **3 times higher** likelihood of cardiac death (within a 7 year follow-up period) from even one moderate to severe toxic CO exposure, when compared to a control group.

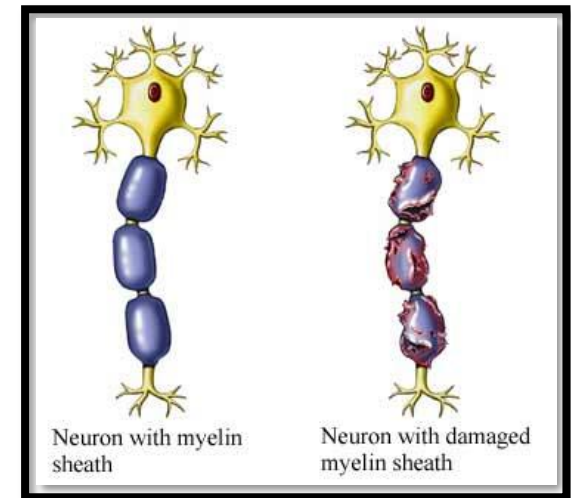
Myocardial Injury and Long-Term Mortality Following Moderate to Severe Carbon Monoxide Poisoning. Henry CR, Satran D, Lindgren B, Adkinson C, Nicholson C, Henry TD. JAMA. 2006;295(4):398-402



# LONG-TERM ISSUES

- ✓ Delayed Neurological Syndrome
- ✓ Long-Term/Chronic Sequelae

**\*Cognitive & Personality Changes, Dementia, Seizures, Parkinsonism, Depression, Short-Term Memory Loss, Incontinence.....**



# WHAT ARE THE OPTIONS?

## Firefighter Rehabilitation and Medical Monitoring



WHY...



# DEVELOPING A BASELINE

## THINK ABOUT THIS.....

2008: 120 LODD

2009: 91 LODD

2010: 87 LODD

2011: 83 LODD

2012: 83 LODD

HEART RATE

BLOOD PRESSURE

TEMPERATURE

SPCO

SPO<sub>2</sub>

THE NFPA STANDARDS 1584/471 EACH DISCUSS  
TAKING CARE OF OUR OWN.....

*\*\*We can do this at the Morning IAP, and follow up at Crew Change*

# MEDICAL MONITORING

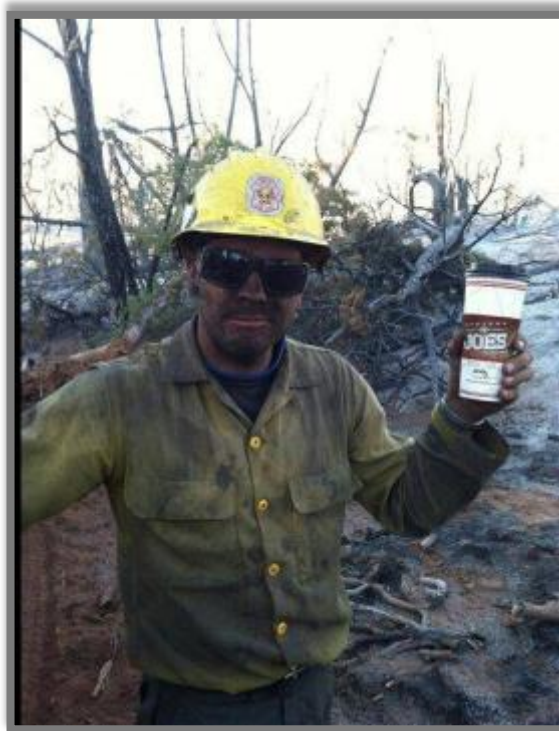
## PROs



## CONs



# WHY YOU NEED THIS..



- The SpCO parameter has an accuracy of +/- 3%
- Example: A reading of 4% could actually be between 1% - 7%
- Refer to Attachment(s) (Whitepaper Accuracy/PubMed)

<http://www.masimo.com/pdf/whitepaper/LAB4425B.pdf>

<http://www.ncbi.nlm.nih.gov/pubmed/22626815>

# DEPLOYMENT

## ☐ Incident Specific

- Baseline done a check-in
- Baseline done in Staging
- Recheck performed at lunch
- Recheck is exhibiting Sx/Sx
- Final Exit from fireline

## ☐ Documentation

- ☐ Part of 214
- ☐ Medical Unit Leader
- ☐ Fillable Forms/Checklist

## ☐ User

- ☐ Scope of Practice
- ☐ 1.5 - 2 hour In-Service

Remove Upon RELEASE and Insert into "Released - Logged Out" Sleeve on REHAB Personnel Accountability Log

Time: \_\_\_\_\_ Released To: ☐ Duty ☐ BLS ☐ ALS ☐ Off Duty  
 \*R1234567\*

USFA & NFPA 1584 Compliant  
**Firefighter REHAB TAG**  
 LEGAL DOCUMENT - DO NOT DISCARD

INCIDENT NAME: \_\_\_\_\_ DATE: \_\_\_\_/\_\_\_\_/\_\_\_\_

**FIREFIGHTER INFORMATION**

NAME: \_\_\_\_\_  
 LOG-IN TIME: \_\_\_\_\_ LOG-OUT TIME: \_\_\_\_\_  
 UNIT ASSIGNMENT: \_\_\_\_\_ AGENCY: \_\_\_\_\_  
 PPE LEVEL: \_\_\_\_\_ EMPLOYEE #: \_\_\_\_\_  
 COMMENTS: \_\_\_\_\_  
 Age: \_\_\_\_\_  
☐ Male ☐ Female

**HEAT SYMPTOMS**

☐ Nausea ☐ Shortness of Breath ☐ Flushed Skin  
☐ Weakness ☐ Cramping ☐ Exhaustion  
☐ Headache ☐ Seizure (ALS) ☐ Mental Confusion  
☐ Sunburned ☐ Rapid Heart Rate ☐ Dehydration  
☐ Absence of Sweating

**COLD SYMPTOMS**

☐ Headache ☐ Low BP ☐ Mental Confusion  
☐ Slow Pupil Response ☐ Numbness ☐ Muscle Rigidity  
☐ Watery Pale Skin ☐ Blisters ☐ Dehydration

**VITAL SIGNS**

Time	B/P	Pulse Rate	Respirations	Temperature

**CO-OXIMETRY READINGS**

Time	SpO2	SpCO	SpMET	Perfusion #

**ORAL SOLUTIONS**

☐ Electrolyte \_\_\_\_\_ Oz. ☐ Water \_\_\_\_\_ Oz. ☐ Food

**NATIONAL WEATHER SERVICE**

Temperature	Wind Chill	Wet	Index

Upon Check-in, Remove REHAB Receipt and Insert into "REHAB Login Receipt" Sleeve on REHAB Personnel Accountability Log

**REHAB**  
 \*R1234567\*

NAME: \_\_\_\_\_

USFA & NFPA 1584 Compliant  
**Firefighter REHAB TAG**  
 DMS-05697 rev. 11-08

**3 STEP CARBON MONOXIDE EXPOSURE ASSESSMENT**

**1 Was Firefighter Exposed to Smoke?** Yes ☐ No ☐

**Initial Carbon Monoxide Assessment Parameters**

0 - 5% Considered Normal  
 5 - 10% Considered Normal in a Smoker  
 > 10% Abnormal in Any Person - Consider High Flow Oxygen  
 > 15% Significantly Abnormal in Any Person - Treatment Mandated

**2 Initial Carbon Monoxide Assessment** SpCO% = \_\_\_\_\_

**Carbon Monoxide Reassessment Parameters**

0 - 5% Acceptable for Return to Firefighting Activities if Medically Cleared  
 5 - 10% Consider High Flow Oxygen until ≤ 5%. Regardless of Symptoms  
 > 10% Abnormal. Assess for Symptoms. Consider High Flow Oxygen  
 > 15% Significantly Abnormal - Treatment Mandated. Consider Transport

**3 Carbon Monoxide Reassessment** SpCO% = \_\_\_\_\_

**REHAB Procedures and Processes**

Responsible Personnel. Establishing Standard Operating Guidelines is the responsibility of each department's company officer or supervisor. Assessment of his or her crew to determine members in need of rehab must occur every 45 minutes. Individual firefighters and their supervisors should undergo rehab following use of a second 30-minute SCBA cylinder, after a single 45- or 60-minute cylinder, or after 40 minutes of intense work without SCBA. Supervisors are permitted to adjust these time frames depending on work or environmental conditions. In addition, EMS staff must have the authority to detain members in rehab or transport members when there are obvious indications preventing them from return to full duty.

The Incident Commander must establish rehabilitation according to the circumstances of the incident. The rehabilitation process must include the following:

- Rest: ☐ Yes ☐ No Minutes: \_\_\_\_\_
- Hydration: ☐ Yes ☐ No (replace lost body fluids)
- Cooling: ☐ Yes ☐ No ☐ Active ☐ Passive (passive and/or active)
- Warming: ☐ Yes ☐ No
- Medical Monitoring: ☐ Yes ☐ No
- Emergency Medical Care: ☐ Yes ☐ No ☐ N/A (if required)
- Relief from Extreme Climactic Conditions: ☐ Yes ☐ No (heat, cold, wind, rain)
- Calorie & Electrolyte Replacement: ☐ Yes ☐ No
- Accountability Documentation Completed: ☐ Yes ☐ No

Released by: \_\_\_\_\_ (Print Name)

Signature: \_\_\_\_\_ Time: \_\_\_\_:\_\_\_\_

Effectively track firefighters' REHAB using the DMS-05697 Firefighter REHAB Accountability System available at [TriageTags.com](http://TriageTags.com).

**Firefighter REHAB Receipt**

Firefighter REHAB Tag  
 DMS-05697  
 TriageTags.com

USA

# EXPOSURE GUIDELINES

## Pulse CO-Oximetry:

- **Normal values:**
  - ✓ 0-5% (non-smokers)
  - ✓ 5-10% (smokers)
- **SpCO 10-15%:**
  - ✓ Assess for signs and symptoms of CO poisoning.
- **SpCO > 15%:**
  - ✓ Treat with 100% Oxygen
  - ✓ Member must have a normal SpCO to be released from rehab (or)
  - ✓ Member must have no more than >5% over baseline SpCO to be released from rehab

# TREATMENT

- Remove the patient from the source
- Check patient SpCO with RAD-57
- Determine Readings\*
- Administer 100% Oxygen per Protocol
- Consider HBO Therapy for Emergent Applications
  - ✓ Adults > 25%
  - ✓ Pediatrics/Pregnant Females > 15%
  - ✓ Neurologically Compromised





# QUESTIONS

